

Section 6: Energy-Plus-Health Program Case Studies



For readers interested in learning from real-world experience implementing Energy-Plus-Health programs, including information on program designs, key partners, and lessons learned.

6.1 Introduction

Case studies include the following programs:

Tier 1:

- [Columbia Gas of Ohio WarmChoice®](#)

Tier 2:

- [Connecticut Children’s Hospital Healthy Homes Program](#)
- [Fort Collins Utility and City of Fort Collins](#)
- [Efficiency Vermont—One Touch](#)

Tier 3:

- [Washington State Weatherization plus Health](#)
 - [North Berkshire Healthy Homes Initiative](#)
 - [Efficiency Vermont Healthy Homes Initiative](#)
 - [New York State Healthy Homes Value-Based Payment Pilot](#)
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6.2 Tier 1: Columbia Gas of Ohio, WarmChoice®

6.2.1 Background and Key Partners

Columbia Gas of Ohio (CGOH) designed the WarmChoice® program over 30 years ago to help low-income homeowners offset rising energy prices. The program goal was to reduce arrearages because the Home Energy Assistance Program (HEAP) payments were insufficient to prevent increasing arrearage amounts from causing high disconnect rates. CGOH implements WarmChoice through contracts with four community-based organizations that serve a combined total of 64 out of Ohio’s 88 counties, which include:

- [Mid-Ohio Regional Planning Commission](#)
- [NeighborWorks® Toledo Region](#)
- [Corporation for Ohio Appalachian Development](#)
- [Ground Level Solutions](#)

These organizations leverage multiple resources to address comprehensive energy retrofits and CGOH was one of the first utilities to partner with existing low-income weatherization networks for delivery of services.¹

From the beginning, WarmChoice contained a health and safety component so that each assisted home is checked for mold, mildew, gas leaks and appliance safety, carbon, and any material condition that weatherization would aggravate to result in an unhealthy home environment. The program covers the costs of: “diagnostic energy inspection, gas appliance safety checks, furnace and water heater repairs or replacement, and whole home energy

⁵⁶ “Building Better Energy Efficiency Programs for Low-Income Households.” Rachel Cluett, Jennifer Amann, and Sodavy Ou. March 2016. American Council for an Energy Efficient Economy, Report Number A1601. p.16

conservation measures (attic, wall, floor, duct and water heater insulation, duct and air leakage sealing). Also, a \$750 incentive is available for furnace replacements by multifamily property owners. WarmChoice can reduce customer bills by an average of 30%, and all customers are left with safe gas heating equipment and a more comfortable home.”²

6.2.2 Program Design

The WarmChoice weatherization project deferral rate is very small, in the 1-2% range. This may be attributed to the more recent decision by CGOH to add funding to support identification and a certain degree of remediation of asbestos and radon hazards, and to cover health and safety repairs like roofing, up to ten thousand dollars if the thermal savings opportunity is very high. This is handled on a case by case basis and uses rate-based funding from two prior customer rate filings associated with early program launch decades ago, and more recent energy efficiency portfolio programs.

CGOH’s community-based program implementers have a network of private and nonprofit contractors that conduct audits and assessments, hazard remediation, and weatherization work. WarmChoice implementers will only undertake projects where the work can be done in a lead-safe manner and have strong referral networks to lead-hazard abatement programs. Program implementers are also well-positioned to package multiple funding sources to improve all substandard housing conditions possible when delivering WarmChoice services.

WarmChoice implementers have a strong referral network with Ohio Healthy Homes and the Breathing Association. The Breathing Association became particularly engaged in energy efficiency issues when customers were coming to them for help with chronic respiratory illnesses that required oxygen machines. The Association secured the ability to administer the Low-Income Home Energy Assistance Program and then began referring customers to WarmChoice program implementers. In recognition of opportunities to strengthen its partnership healthy homes programs, CGOH offers philanthropic support as well.

6.2.3 Lessons Learned

CGOH’s WarmChoice Team Leader Adrian Andrews indicates that there are some important considerations when attempting to braid energy efficiency and healthy homes goals:

1. Focus on whole-house retrofits, not just gas efficiency and try to align program requirements to make delivery easy for program implementers.
2. Housing conditions must be addressed first if program wants to reach its savings goals.
3. While not quantified or substantiated with data, CGOH sees non-energy benefits that include housing stability, comfort and health.
4. Partnering with community organizations creates robust referral networks and can happen on many levels—CGOH is also working with the Meals-on-Wheels organization that has a visiting nurse who can deliver efficiency materials while in customers’ homes.

⁵⁷ American Gas Association, WarmChoice Weatherization and Home Performance Solutions Programs, https://www.aga.org/sites/default/files/warm_choice_weatherization_and_home_performance_solutions_programs_-_columbia_gas_of_ohio_-_final.pdf

In the end, Andrews reports that, “the ability to do this work comes back to the utility and what the leadership views as its mission, which allows us to do a lot. We have a strong leadership that believes in giving back and building the community.”

6.3 Tier 2: Connecticut Children’s Healthy Homes Program

6.3.1 Background and Key Partners

Eversource CT, United Illuminating, Connecticut Natural Gas, and EnergizeCT serve as energy efficiency PAs administering the Home Energy Solutions (HES) and, for income qualified customers, the Home Energy Solutions-Income Eligible (HES-IE) programs, which deliver standardized home performance services statewide. HES and HES-IE provide a home energy performance evaluation that includes the direct installation of energy saving items such as LED light bulbs and hot water saving measures as well as caulking to keep homes more comfortable and reduce drafts. The assessment also identifies additional energy-saving measures for deeper savings. Financing is available at 0% interest for up to 36 months and rebates to help offset the cost for these measures are also available. HES-IE customers may qualify for incentives that cover the cost of installation for these add-on measures up to their full cost of installation. The HES-IE program also cost shares with community action agency programs that administer weatherization assistance projects.

In 2017, HES and HES-IE program data showed that about 20% of properties receiving energy assessments failed to meet health and safety standards for energy efficiency interventions and were being deferred due to the presence of asbestos hazards, vermiculite, moisture issues, or carbon monoxide leaks.³ The majority of deferrals fell in the HES-Income Eligible (HES-IE) market segment. The program administrators were interested in identifying resources to remove the barriers causing deferrals.

6.3.2 Program Design

The NSTAR and Eversource merger in 2015 made funds available to the Department of Energy and Environmental Protection (DEEP). DEEP authorized Eversource Connecticut and United Illuminating to target \$1.5 million to address the HES-IE deferrals. The two utility partners jointly implemented the Clean Energy Healthy Homes Initiative to remediate specific hazards causing weatherization deferrals in low-income homes. The joint program was designed to be seamless for both customer bases, with Eversource taking the lead to deliver identical services to both utilities’ customers.

Eversource recognized that vendors needed training to identify the specific hazard that prevented a blower door test, such as asbestos, mold, and/or vermiculite. The utility trained vendors to identify at least one hazard, then document and report the specific barrier or they would not get paid for the home visit. Once hazards were identified, Eversource needed a contractor pool to perform a scope of services that included hazard testing, scope of work development, and remediation work. It was soon clear that the marketplace lacked contractors

⁵⁸ Connecticut Green & Healthy Homes Pre-Feasibility Analysis Report. Prepared by the Green & Healthy Homes Initiative for Connecticut Green & Healthy Homes Partners. June, 2018. p. 9.

with the skills to deliver a comprehensive package of services. Instead, contractors recommended breaking the environmental testing and clearance component apart from the remediation, repair, and disposal work. Eversource received and accepted four bids submitted from the three environmental hazard firms and a single remediation contractor.

This initiative allowed Eversource to build relationships with environmental services firms and a contractor network that performs remediation work. The Hartford region now has a robust group of trained weatherization contractors to identify and document all barriers to implementation. After the weatherization vendor identifies the barriers and the utility obtains a signed participation form from the customer, an environmental technician tests for and confirms conditions that require remediation and develops the scope of work. If the scope of work is approved by the utility, the remediation contractor then proposes and completes a scope of work, notifies the environmental technician upon job completion, and the environmental technician re-tests. A clearance certification allows for final payment from Eversource and UI to the remediation contractor. This report also goes to the weatherization vendor so that implementation of energy efficiency measures can proceed.

The Eversource and United Illuminating Healthy Homes pilot inspired Connecticut Children's Medical Center's Healthy Homes Program's director, Marcus Minor-Smith, to formalize a referral partnership that would "integrate health and safety interventions, lead hazard control, energy efficiency interventions, and housing rehabilitation for property owners by coordinating resources in an efficient manner to produce healthy homes."⁴ The Connecticut Children's Healthy Homes Program grew out of a 2015–2017 effort by the Hartford-based Local Initiatives Support Corporation (LISC) to convene cross-sector partners in affordable housing and residential energy efficiency to discuss stronger coordination and referrals. These meetings established relationships and mutual goals between affordable housing organizations, energy efficiency program administrators from Connecticut utilities, and the Connecticut Children's Medical Center's lead-hazard abatement and healthy housing program. LISC recognized the synergies between affordable housing, energy efficiency, and lead-hazard abatement programs and leveraged these cross-sector relationships to build collaboration.

Several years prior to formalizing referral partnership into the Building for Health initiative, Connecticut Children's Healthy Homes Program was exploring opportunities for cross-sector partnerships with Eversource and UI with mixed results. Smith had worked in affordable housing development and finance and brought the energy efficiency lessons he learned to Connecticut Children's. There, he found it natural to discuss with medical personnel the evidence that shows how energy efficiency magnifies and intensifies health outcomes by improving air quality and decreasing asthma outbreaks. Through conversations with his colleagues, Smith explained the value for Connecticut Children's clients in forming collaborative partnerships with affordable housing providers and utilities.

Now that the Eversource and UI funding for remediation activities has been expended, Smith is finding that fewer resources mean fewer opportunities to leverage weatherization funding for lead-hazard abatement and healthy housing customers. As a new strategy, Connecticut

⁵⁹ Connecticut Children's Hospital, Healthy Homes Program, <https://www.connecticutchildrens.org/community-child-health/community-child-health-programs/healthy-homes-program/>

Children's and Eversource are creating a stronger referral mechanism so that renters especially, who receive lead-hazard abatement and healthy housing work through Connecticut Children's, will automatically receive a healthy homes assessment and be referred to the utilities for any energy efficiency upgrades (and commensurate utility bill cost reduction) available. To formalize referrals, Smith is working with Tohn Environmental Strategies to implement One Touch, an electronic mechanism that logs referrals to multiple services for each household, with automatic notifications that the agency receiving the referral followed up.

6.3.3 Lessons Learned

With grant funds expended, Eversource and UI are no longer accepting new remediation projects and are analyzing program data before seeking new funding sources. Initial data and learnings from the Eversource and UI Healthy Homes pilot include:

1. Energy efficiency savings are unlikely to justify spending much on remediation due to cost-effectiveness constraints. Eversource indicated that there are changes pending to Connecticut's cost-effectiveness test which will consider non-energy health benefits, and this may re-open the opportunity to invest in remediation work.
2. Cost of remediation averaged around \$20,000, but some projects with multiple barriers including mold are as high as \$58,000 dollars. Initially, the program had a \$10,000 cap per home but the utilities learned that mold remediation can be very costly to properly fix and prevent water from re-entering again.
3. Knob and tube wiring is also expensive to replace. The program is looking into the savings opportunities from weatherization to determine if the cost-benefit test can work to pay for deactivating or removing the knob and tube and bringing homes up to code.
4. For 50 homes completed, the program found that most of the health and safety barriers were asbestos (34%), mold (26%); and vermiculite (20%) with the remainder including two or more of these hazards as well as a small number of homes with pests.
5. Contractor training is central to the program's success. Contractors need liability protection from making a bad situation worse and are not necessarily familiar with or trained to recognize and handle hazardous materials.
6. Eversource and UI are developing their own protocols for contractors by developing guidelines on how to weatherize buildings after a hazard is remediated. For example, blower door tests must avoid traces of remnant contaminants from being released after remediation.
7. Eversource will document what weatherization work was done for the 50 homes remediated by the Clean Energy Healthy Homes Initiative and calculate the savings and cost per MMBtu.

Early learning from the Building for Health cross-referral collaboration with Connecticut Children's Hospital includes:

1. Lead and healthy homes clients have energy needs, which confirms the value proposition of the referral system.
2. Streamlining income qualification requirements for referrals to energy programs for clients in designated neighborhoods coming from other low-income programs can help reduce intake challenges.
3. Training may be needed to ensure that energy programs understand the range of health referrals and how to identify home conditions triggering a referral. Field based cross training may be useful.

4. Project coordination could be helpful in ensuring a comprehensive alignment of work across multiple programs, and to allow for a smooth transition of a project from one program to the next.
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6.4 Tier 2: City of Fort Collins and Fort Collins Utility, Colorado

6.4.1 Background and Key Partners

In June 2011, the City of Fort Collins' Sustainability Services Area founded a Healthy Homes program with a mission to create a healthier community and safe home environments. Selina Lujan, the Program Coordinator for the City of Fort Collins' Healthy Homes program notes that 10 years earlier the City initiated conversations about the impacts of indoor air quality with the American Lung Association (ALA) and attended Healthy Homes trainings facilitated by the ALA. The City distributes an air quality survey to the community approximately every five years. It asks about respiratory ailments, and the results have consistently revealed that one in four households reports that a family member has a respiratory illness, and that the illness is an issue for them.

Over time, the City has modified the ALA training framework to meet local needs. It has also created a program model using the NHCC and federal government guidelines to train community volunteers to become Master Home Educators. People with this designation are specialists in each of the eight principles of a healthy home. Upon request, the volunteer Master Home Educators conduct healthy homes assessments and discuss with the community low-cost or no-cost steps their members can take to improve indoor air quality.

6.4.1 Program Design

Healthy Homes assessors use a 2-hour Master Home Educator Checklist to examine conditions and ask questions. They then give the resident recommendations, a radon test kit, a natural all-purpose cleaner, and if needed, a carbon monoxide detector or fire alarm. The assessment's goal is to reduce exposure to home pollutants that might be causing a negative respiratory reaction. Those pollutants might be cleaning chemicals, biological pollutants, particulate matter—and to prevent home safety hazards by identifying needs for fire escape plans, fire alarms, and carbon monoxide detectors. The Master Home Educators also use an infrared camera during the walk-through to identify major air sealing and insulation gaps and moisture problems. To mitigate the program's liability, the household is required to sign a disclosure form.

Program staff will follow up on recommendations, remind residents to put the completed radon kit in the mail, and ask if they need additional resources. One of the benefits of the assessment is a coupon for a reduced energy audit fee. The program documents an educator's findings related to energy, combustion safety, or ventilation concerns and deficiencies. The educator might advise that a more comprehensive assessment from a professional energy auditor could make a significant difference. The resident also receives a referral to the Efficiency Works™ Home (EWH) program.

Following the Healthy Homes assessment, the resident can call the Fort Collins Utilities' (FCU) EWH program and enroll. EWH is a regional residential efficiency program administered by Platte River Power Authority on behalf of the four equity partner cities. The program has a customer enrollment service that documents the referral source as the Healthy Homes program. Kim DeVoe at FCU explained that EWH was a 2014 regional outgrowth of Fort Collins Utilities Home Efficiency Program (HEP), which began in 2009. DeVoe attended the City's nascent Healthy Homes training and conversations with the American Lung Association, because he was working on indoor air quality issues to be addressed by the City's Green Building Code amendments. He was also creating the building science-based installation standards for the HEP. Since 2011, DeVoe has been a subject matter expert, training others on moisture and ventilation identification and mitigation for the Fort Collins Healthy Homes program.

The Healthy Homes program has assessed more than 900 homes since 2011. In 2018, it was one of four recipients of the U.S. Secretary of Housing and Urban Development's Award for Healthy Homes.

6.5 Tiers 2 and 3: Efficiency Vermont Healthy Homes Initiative

6.5.1 Background and Key Partners

Efficiency Vermont was created by VEIC as the nation's first statewide energy efficiency utility. Its purpose is to transform the way Vermonters use energy—for better living. This original objective continues to benefit all Vermonters, support the State's energy goals, and expand the local economy while protecting the environment. Through collaborations with state agencies, contractors, product distributors and suppliers, nonprofit organizations, and consumers, Efficiency Vermont offers electrical and thermal energy efficiency programs and services that include training, technical assistance, and financial support. The revenue to support these activities comes from a system benefit charge on electric utility bills and revenue from the auction and sale of energy efficiency savings on the ISO New England Forward Capacity Market and Regional Greenhouse Gas Initiative market.

Efficiency Vermont participates in a Tier 2 healthy homes approach by contracting with the state's five regional federal and state weatherization assistance program (WAP) partners to install electrical efficiency measures at the time of weatherization. This partnership also delivers energy coaching that includes health and safety information and coordinated referrals for housing rehab, health, social service, and energy efficiency needs. In 2015, the state Office of Economic Opportunity (OEO), which oversees the federal and state weatherization assistance program, agreed to coordinate a formal and centralized referral process among the WAP partners, Efficiency Vermont, and community-based organizations through One Touch—the electronic platform that connects families to resources for lead-based paint hazard remediation, asthma, smoking cessation, early child development, and more. Over 2,300 single-family homes have participated in the One Touch survey program and 20% of One Touch energy home visits resulted in a referral to a health or housing partner offering services.

In 2016, NeighborWorks of Western Vermont (NWWVT), a local homeownership and housing rehab center participating in Efficiency Vermont's Home Performance with ENERGY STAR program, began another Tier 3 program by leveraging Efficiency Vermont's energy efficiency program incentives, Rutland Regional Medical Center's in-home asthma program supported by the Department of Health and a grant from RRMC's community benefits fund to deliver integrated home energy and rehab program services for 55 patients identified by the hospital with asthma, COPD or home mobility concerns. This project design formed the basis for Efficiency Vermont's Tier 3 healthy homes pilot project launched in 2018.

In early 2017, Efficiency Vermont undertook a Healthy Homes Opportunity Assessment to engage Vermont's health care community beyond facility-related energy efficiency. The Assessment explored collaboration opportunities to resolve some of Vermont's residential energy efficiency challenges related to indoor environmental air quality. The Opportunity Assessment identified market barriers and areas where Efficiency Vermont could fill a need in meeting potential partner goals while advancing Efficiency Vermont's mission and meeting key program performance indicators.

As a result of the Opportunity Assessment, Efficiency Vermont leveraged its partnerships with the Weatherization Assistance Program, Department of Health, other community organizations, and hospitals to establish a healthy homes program budget and secured funding from each partner.

The outcomes of Efficiency Vermont's Tier 2 and 3 program strategies include:

- ✓ An internal roadmap for integrating healthy home principles and resources into all of Efficiency Vermont's residential program designs and services, and document the specific process for each program/housing type to enable market-wide consistency and transparency (Tier 2 and 3)
- ✓ An emerging culture of healthy homes in Vermont raising awareness with consumers, health care providers and contractors on the connections between indoor environmental quality, energy efficiency and health (Tier 2 and 3)
- ✓ Expansion of the initial pilot to standardize the collaboration among health care providers, weatherization programs, and Efficiency Vermont using a [Weatherization Plus Health](#) approach targeting customers with chronic respiratory illness or fall hazards to improve housing quality, indoor air quality, and health outcomes, with formal tracking mechanisms (Tier 3)
- ✓ Leveraging of existing industry research to quantify the health-related non-energy benefits of low-income weatherization retrofits (Tier 2)
- ✓ Expansion of One Touch to new partner organizations and consumer markets (Tier 2)
- ✓ Identification of health- and indoor environmental quality-specific products with opportunities for energy efficiency improvements such as oxygen concentrators, whole-house balanced ventilation and advanced kitchen ventilation (Tier 2 and 3)
- ✓ Evaluation of existing program data for indoor environmental quality metrics and the creation new tracking procedures for measuring and reporting pre and post energy efficiency intervention indoor air quality measurements. (Tier 2 and 3).

6.6 Tier 3: Washington State Weatherization Plus Health

6.6.1 Background and Key Partners

In 2015, the state legislature expanded the rules for the low-income residential weatherization program to include healthy homes improvements and appropriated \$4.3 million to this Weatherization Plus Health (Wx+H). This program builds upon decades of work conducted by the Opportunities Council and the King County Housing Authority to deliver healthy homes programs with energy upgrades. Administered by the Department of Commerce, Wx+H offers supplemental funding to organizations providing low-income weatherization services to offer health-related repairs through a basic program delivering a minimum set of repairs and an enhanced program targeted to individuals with respiratory concerns, such as asthma.

In the enhanced program, administered through a competitive grant program, weatherization agencies were encouraged to collaborate with health partners for client referrals, incorporate home based health supports through community health workers, and offer more extensive repairs (flooring, plumbing, roof repair, or replacement, gutters/downspouts, comprehensive cleaning, fall prevention, dehumidifiers, crawlspace sealing). Eight agencies offered the enhanced Wx+H program. Three of the eight partnered with public health agencies or clinics to deliver community health worker (CHW) visits and the remaining grantees worked with community health partners on consultation and referrals. Roughly 1 in 4 (23%) completed projects resulted from community partner referrals; the remaining referrals came from weatherization agency/organization clients.

6.6.2 Program Delivery and Results

Wx+H funded services were provided to 254 households. In addition to weatherization measures, 65% received dust mite covers, walk-off mats, HEPA vacuums, and smoke detectors. Of the higher-cost measures, the most commonly installed measure was carpet removal and replacement with low-VOC flooring. Other higher-cost measures such as advanced ventilation, plumbing repairs, roof replacement, pest mitigation, and mold and moisture abatement were installed in approximately 15% of comprehensive projects. The median total cost for a comprehensive Wx+H project was \$14,244, the median unit cost for the *plus health* measures was \$3,075.⁵

Utility funds support roughly 35% of core energy upgrade work and eligible health and safety repairs. The pilot documented significant need and demand for Wx+H services among existing weatherization clients. Evaluators estimate that between at least 20% and in some communities as high as 40% of Washington weatherization clients are medically vulnerable, and low-income residents in Washington state are twice as likely to have asthma when compared to residents with incomes greater than \$75,000.⁶

⁶⁰ Washington State University, 2018. The Washington State Weatherization Plus Health Pilot: Implementation and Lessons Learned

⁶¹ Washington Department of Health, 2013. *Asthma and Socioeconomic Status in Washington*. https://www.doh.wa.gov/Portals/1/Documents/Pubs/345_333-AsthmaAndSocioeconomicStatusInWashingtonState.pdf

Health outcome data are available from one enhanced program delivered by the Pierce County weatherization program, which collaborated with the Pierce County Healthy Homes Partnership to deliver energy upgrades, healthy homes repairs, and community health worker visits (1–3) in 48 homes to 73 residents with respiratory health concerns (71% with asthma and 29% with COPD). One year after receiving services, 65% of clients reported fewer respiratory symptoms (47% report *significant* improvements in asthma symptoms), 70% reported an improved quality of life, and evaluators documented asthma related emergency department visits and hospitalizations.⁷

The program implementation report concluded that:

- Many existing low-income weatherization clients are medically vulnerable
- Investments in Wx+H measures result in significant and positive health outcomes
- Considerable non-energy benefits are likely to meet or exceed measure costs.⁸

The Wx+H program expanded its reach to work with 15 weatherization agencies in 2018-19.

6.6.3 Lessons Learned

Lessons learned from the Wx+H program include:

1. Weatherization program requirements for rental property owner participation make it challenging to serve rental units, limiting the potential to serve some patients with respiratory issues.
2. Weatherization providers partnering with medical or public health/community health workers were more comfortable and effective in addressing the client needs related to respiratory conditions than local agency staff. However, developing health partnerships requires significant effort; funding to support partner development is essential to build bridges for integrated programs.
3. Programs could benefit from access to standardized tools to conduct healthy homes assessments, prioritize home repairs, provide client engagement and support particularly on respiratory issues.
4. Some high-need households require repairs that exceed the household \$4,000 cap; allowing agencies to manage Wx+H to an average cost per unit would be beneficial.

6.7 Tier 3: North Berkshire Healthy Homes Initiative, Pittsfield, Massachusetts

6.7.1 Program Origin and Key Partners

In 2017, the [Center for EcoTechnology](#) (CET) became interested in leveraging the energy efficiency workforce to help improve home environmental conditions and occupant health outcomes. As a nonprofit helping people and businesses save energy and reduce waste, they were drawn to the opportunity to engage with health care partners to improve the lives of patients struggling with respiratory issues such as asthma and chronic obstructive pulmonary disease (COPD). CET also wanted to explore how to integrate energy and healthy homes work and identify potential health care resources to support such efforts. CET is a lead vendor for the

⁶² Washington State University, 2018. The Washington State Weatherization Plus Health Pilot: Implementation and Lessons Learned

⁶³ Ibid.

Mass Save program for market-rate homes, which provides no cost energy audits, and manages multiple energy programs.

CET engaged the Berkshire Community Action Council, which provides weatherization services to low-income clients through the federal and state weatherization assistance program, to provide energy audits and upgrades to low-income homeowners.

To engage health care partners, CET leadership reached out to senior leaders at Berkshire Health System (BHS), who were interested in programs that might help address high rates of asthma and COPD and associated emergency department usage. As a result, BHS's pulmonology department became a key partner, identifying patients who could benefit from the Energy-Plus-Health services and providing support to track changes in health outcomes.

While local energy utilities did not participate directly in the project due to liability concerns, utility incentives and funding were key ingredients to support the home energy work. One utility has expressed interest in how this program could help engage customers and document the non-energy benefits of efficiency work and remains engaged in developing future efforts.

This pilot project was supported by E4TheFuture and the US Environmental Protection Agency with financial and technical assistance totaling \$85,000. CET dedicated significant additional resources to develop and implement the program. Funding was used to support staff, develop tools and protocols, and complete healthy homes repairs in a small number of homes to determine if the approach was feasible and of value to partners.

6.7.2 Pilot Program Delivery

BHS's pulmonology department identified and referred patients with frequent asthma or COPD emergency department visits or hospitalizations to CET, which provided an energy audit and healthy homes assessment. In low-income homes, the BCAC conducted the energy audit. Healthy homes evaluations were conducted in three homes. The participants received educational reports, with repair recommendations and healthy home strategies to address symptom triggers. The healthy homes repairs were recommended in two homes, and one home did not need repairs.

Recommendations for one moderate income home included \$11,809 of energy work, \$8,763 of which was supported by utility incentives, and \$7,000 of healthy homes repairs (gutters, replace carpet, Heat Recovery Ventilator—HRV) for a total of \$18,809 in Energy-Plus-Health repairs. However, this work was not installed because of mold and moisture issues discovered in the crawlspace which would require an additional \$19,000 to repair. To date, CET has been unable to secure the additional funds needed to proceed.

The second, a low-income home, received \$4,753 of energy efficiency work supported by the weatherization program and \$6,614 of healthy homes repairs (replace carpet; HRV) for a total of \$11,367 in Energy-Plus-Health repairs. CET will follow up at three, six, and twelve months to assess patient health status and both homes' energy use. CET is working to scale this demonstration program into a larger pilot effort that would produce a greater amount of quantitative data on the costs and health and energy outcomes of its approach.

6.7.3 Lessons Learned

Lessons learned from the North Berkshire Healthy Homes Initiative include:⁹

1. Time is needed to build relationships among energy and health partners and to develop program workflows and protocols (e.g., patient consent, data sharing, referrals pathways).
2. While the value proposition of reaching added customers may be compelling to utilities, concerns related to liability can prevent their direct engagement. Nonetheless, community-based partners can deliver utility programs through contractual relationships providing utility incentives to healthy home customers while allowing utilities to maintain a risk-acceptable separation from the health aspects of the program.
3. Hospital patient referrals are most successful when initiated by a trusted medical provider (nurse, doctor) as opposed to having the hospital provide the energy program a list of patients who could benefit from the program. Patients with COPD pose unique challenges as many were too sick to participate in the program.
4. Do not assume all local hospitals provide pediatric asthma care. When possible consider partnering with a hospital that provides such care because families with children struggling with asthma can be a highly motivated group eager to enroll in these types of programs
5. Once a referral is made, at least six months is needed to enroll a household, conduct the assessment, and complete repairs.
6. To avoid delays, pre-identify contractors who can provide the range of healthy homes repairs. This was challenging as the team was not certain in advance of the assessments what type of repairs would be needed, and work required flooring, gutter and grading contractors in addition to the weatherization contractors that typically participate in utility energy efficiency programs.
7. Develop standard tools for healthy homes assessments and prioritization of repairs, to help streamline decision making and establish client expectations.
8. It was difficult to identify housing rehab funds to support the healthy homes repairs; energy funds are available to support the core energy work in low-income and market-rate homes.

6.8 Tier 3: New York State Healthy Homes Value-Based Payment Pilot

6.8.1 Overview

The New York State Healthy Homes Value-Based Payment Pilot (Pilot) will seek to develop a replicable model for implementing a healthy homes approach to residential building treatments under the Medicaid Value-Based Payment (VBP)¹⁰ framework. By validating impacts such as health care cost savings and benefits to residents, as well as providing market development support such as specification of services and VBP contracting guidance for these interventions,

⁶⁴ Center for EcoTechnology. The North Berkshire Healthy Homes Initiative: Phase 1 Report, November 2018. See automatic download at: <https://www.cetonline.org/CETHealthyHomeReport>

⁶⁵ New York State Medicaid is transitioning the managed care health care delivery system from a fee-for-service to a VBP model that links health care provider performance and reimbursement through a pre-determined set of value metrics related to both health outcomes and health care cost savings. To support local reinvestment, two of three VBP arrangement levels require incorporation of a community-based organization (CBO) engaging in work focused on the social determinants of health (SDH) Substandard housing is included among the recognized social determinants of health. The substandard housing determinant places energy efficiency and weatherization measures, when incorporated within a healthy homes intervention, within the DOH value-based payment model.



the Pilot will facilitate the adoption of healthy homes treatments by Medicaid managed care organizations (MCO) as part of their Medicaid VBP Arrangements that incorporate social determinants of health. Doing so addresses avoidable medical costs associated with asthma and household injury, while providing improved standard of care. It also encourages third party capital investment in the demonstrated services upon MCO adoption of healthy homes interventions within the value-based payment social determinants of health framework beyond the Pilot.

The Pilot will be planned and implemented in partnership with the New York State Department of Health (DOH). The Pilot will be funded through NYSERDA's Clean Energy Fund,¹¹ estimated at approximately \$10M. In addition, NYSERDA will advise intervention planning and facilitate implementation related to energy and housing measures. The DOH Office of Health Insurance Programs will secure MCO participation in the Pilot and oversee all VBP contracting activities. The DOH Office of Public Health will advise intervention planning and facilitate implementation related to asthma trigger reduction measures and asthma care management services. The DOH Center for Environmental Health will advise Pilot intervention planning related to home injury prevention measures. Evaluation of Pilot activities will be undertaken cooperatively by NYSERDA and the DOH Office of Public Health.

In tandem with Pilot activities, NYSERDA will provide market supports in order to adequately prepare for the adoption of healthy homes interventions into the Medicaid managed care health care delivery system as standard business practice beyond the Pilot. NYSERDA will prepare a measure list and service delivery specifications for healthy homes interventions that address asthma and home injury. Credentialing/training needs that foster a network of qualified home contractors will be identified to ensure market preparedness. Additional market supports will include toolkit-style guidance for incorporating healthy homes interventions into Medicaid value-based payment contracts that address substandard housing as a social determinant of health.

6.8.2 Barriers Addressed

New York State Healthy Homes Value Based Payment Pilot activities address a number of barriers that exist at the intersection of energy and health.

- *Limited funding stream for low-income energy efficiency services.* Validating cost savings of healthy homes interventions will provide an evidence base that supports a long-term outcome of Medicaid funding healthy homes interventions as a sustainable funding model.
- *Lack of access to energy efficiency services for low-income households.* Managed care organization adoption of healthy homes interventions as part of the value-based purchasing social determinants of health framework would expand energy efficiency services to New York residents who might not otherwise be exposed to the opportunity.
- *Fragmented delivery of health, housing, energy programs and services across New York State.* Pilot activities will assess best practices for operationalizing healthy homes interventions for improved and more efficient service delivery.

⁶⁶ The Clean Energy Fund (CEF) is a 10-year, \$5 billion funding commitment comprised of ratepayer dollars to support Governor Andrew M. Cuomo's Reforming the Energy Vision (REV), a strategy to build a clean, resilient, and affordable energy system for all New Yorkers. CEF reduces the cost of clean energy by accelerating the adoption of energy efficiency to reduce load while increasing renewable energy to meet demand.

- *Substandard housing (e.g. poor air quality and other environmental deficits).* Healthy homes interventions provide residential measures that improve energy efficiency and health outcomes for residents and create a healthier, safer, and more comfortable home environment.
- *Quality of care for asthma patients.* The Pilot provides a model for improved standard of care for Medicaid members with poorly controlled asthma.
- *New York State Medicaid costs incurred.* By taking a preventative approach to asthma and unintentional household injury, the Pilot addresses high costs to New York State Medicaid for emergency department and hospitalizations related to asthma and unintentional household injury.
- *Lack of access to community health resources.* Healthy homes interventions in the context of the Pilot include an in-home education component that provides information about health-related resources in a resident's local community.
- *Medicaid Value-Based Payment reform uptake.* The Pilot provides an opportunity for managed care organizations (health plans) to incorporate healthy homes interventions under VBP arrangements. Market support activities including contracting guidance and specifications to deliver healthy homes interventions will provide managed care organizations with needed tools to support future independent uptake.

6.8.3 Referrals

The Pilot aims to serve 500 Medicaid member homes, targeting residents with persistent asthma that is not well controlled. The Pilot will prioritize, but not be limited to, providing services to children age 0 to 17 and the dwellings in which they reside. Referrals for the Pilot will come from participating MCOs, recruited by DOH Office of Health Insurance Programs. Participating MCOs will identify their attributed Medicaid member population. Informed consent will be obtained from interested eligible members.

6.8.4 Intervention

Pilot participant households will undergo a full intervention, which includes a robust suite of services that include:

- Residential energy and environmental assessment.
- Energy efficiency measures (e.g. envelope improvements, electric load reduction, heating system repair/replacement, ventilation).
- Asthma trigger reduction measures (e.g. mold remediation, carpet removal, integrated pest management, furnace filters).
- Household injury prevention measures (e.g. smoke alarms, carbon monoxide detectors, stair/railing repair).
- Home skilled nursing visits, multiple (e.g. In-home education related to asthma medication self-management).
- Community health worker support (e.g. supplemental education, guidance on Pilot processes).
- Resident education, connection to local services, and post-remediation follow-up (e.g. In-home education related to dwelling measure optimization, referrals to or information about available local services not supported by the Pilot).

6.8.5 Timeline

Pilot planning is currently in progress. Pilot activities are expected to be active in the field in 2019.